

This listing of claims will replace the prior version in the application.

Claims

1. (canceled)
2. (currently amended) The method as claimed in claim 1 ~~18~~, characterized in that ~~the~~ separation sections (S1), (S2) and (S3) are ~~the~~ respectively the bottom, intermediate and upper sections of the same column (C3), the stream (4) from the bottom of the column (C2) being sent to the column (C3) above ~~the~~ separation section (S1).
3. (currently amended) The method as claimed in claim 2, characterized in that the number of theoretical trays of the column (C3) is 8 to 25, ~~particularly 10 to 20~~, the number of theoretical trays of ~~each of the sections~~ section (S1) is 1 to 5, of section (S2) is 1 to 10 and of section (S3) is 3 to 20 ~~of the column (C3) being respectively:~~
 - ~~— 1 to 5, particularly 1 to 3;~~
 - ~~— 1 to 10, particularly 1 to 5; and~~
 - ~~- 3 to 20, particularly 5 to 15.~~
 - ~~-~~
4. (currently amended) The method as claimed in ~~either of claims 2 and 3~~ claim 2, characterized in that the pressure at the top of the column (C3) is 2.7 to 27 kPa, ~~particularly 6.7 to 24 kPa~~, the temperature of the bottom of the column (C3) is 150 to 250°C, ~~particularly 180 to 230°C~~, and the temperature of the top of said column (C3) is 40 to 110°C, ~~particularly 65 to 95°C~~.
5. (currently amended) The method as claimed in ~~one of claims 2 to 4~~ claim 2, characterized in that the column (C3) is a distillation column provided with a bottom boiler, a top condenser, with a reflux rate T_R imposed at the top of 0.5/1 to 4/1, ~~preferably of 0.5/1 to 2/1~~.

6. (currently amended) The method as claimed in claim 1, characterized in that ~~the~~ separation sections (S1) and (S2) are the respectively lower and upper sections of the same column (C3₁), the stream (4) from the bottom of the column (C2) being sent to the column (C3₁) above ~~the~~ separation section (S1), and ~~the~~ separation section (S3) is the single section of a column (C3₂) supplied at its bottom with the stream from the top of the column (C3₁).

7. (currently amended) The method as claimed in claim 6, characterized in that the pressure at the top of the column (C3₁) is 2.7 to 27 kPa, ~~particularly 4 to 15 kPa, and~~ the pressure at the top of the column (C3₂) is 2.7 to 27 kPa, ~~particularly 6.7 to 24 kPa, and in that~~ the temperature at the bottom of each of the columns (C3₁) and (C3₂) is 150 to 250°C, ~~preferably 170 to 210°C, and~~ the temperature at the top of each of the columns (C3₁) and (C3₂) is 40 to 110°C, ~~preferably 60 to 90°C.~~

8. (currently amended) The method as claimed in claim ~~1~~ 18, characterized in that ~~the~~ separation sections (S1) and (S2) are each formed from at least one evaporator, the stream (4) from the bottom of the column (C2) being sent as feed to the evaporator (E1) or to a first evaporator (E1₁) of a plurality of evaporators mounted in series of ~~the~~ separation section (S1), the stream (9) containing the absorption solvent or solvents stripped of the lighter compounds being obtained at the bottom of the evaporator (E1) or of the last evaporator (E1₂) of the series of evaporators (E1₁;E1₂) of ~~the~~ separation section (S1), and ~~the~~ separation section (S3) is the single section of a column (C3₃) supplied at its bottom with the stream from the top of the evaporator (E2) or from the last evaporator (E2₂) of a plurality of evaporators mounted in series of the section (S2).

9. (currently amended) The method as claimed in claim 8, characterized in that the pressure at the top of the column (C3₃) is 2.7 to 27 kPa, ~~particularly 6.7 to 24 kPa, and that the~~ temperature at the bottom of column (C3₃) is 150 to 250°C, ~~particularly 170 to 210°C, and the~~ temperature at the top of said column (C3₃) is 40 to 110°C, ~~particularly 60 to 90°C.~~

10. (currently amended) The method as claimed in ~~one of claims 1 to 9~~ claim 18, characterized in that the (meth)acrylic acid concentration in the feed to the section (S1) is 5 to 70% by weight, ~~particularly 10 to 30% by weight~~.
11. (currently amended) The method as claimed in ~~one of claims 1 to 10~~ claim 18, characterized in that the stream (5) of heavy intermediate compounds from the bottom of ~~the~~ separation section (S3) is sent to a column (C4) ~~adapted~~ for removing, at the top, at least part (8) of the heavy intermediate compounds, in a stream (8), and for recovering, at the bottom, a stream (7) of the heavy solvent or solvents and of the polymerization inhibitor or inhibitors initially present in the stream (5) fed to the column (C4), said stream (7) being ~~advantageously~~-recycled as a stabilizing stream at the top of the preceding columns or separation sections (~~C1; C2; C3; C3₁; C3₂; C3₃~~).
12. (currently amended) The method as claimed in claim 11, characterized in that the pressure at the top of the column (C4) is 2.7 to 40 kPa, ~~particularly 9.3 to 20 kPa~~.
13. (currently amended) The method as claimed in ~~one of claims 1 to 9~~ claim 18, characterized in that the stream (9) from the bottom of ~~the~~ separation section (S1) is recycled to the top of the absorption column (C1), ~~if necessary~~ optionally after removing a stream (11) of heavy impurities having a boiling point higher than that of the solvent ~~or higher than that of the solvent having the highest boiling point~~.
14. (currently amended) The method as claimed in ~~one of claims 11 to 13~~ claim 18, characterized in that, ~~to offset the losses occurring during the purification sequence, fresh~~ heavy absorbent solvent or solvents are introduced into streams 5, 7 and/or 9 ~~the solvent rich loops, particularly into the stream of the bottom of the section (S1) and of the column (C4) (respectively 13 and 7), recycled at the top of the column (C1), and/or, in the case in which this solvent contains light impurities with a boiling point close to that of the (meth)acrylic acid, additional solvent is fed to the stream (5) feeding the column (C4).~~

15. (currently amended) The method as claimed in ~~one of claims 11 to 14~~ claim 18, characterized in that the at least one ~~or more~~ heavy hydrophobic ~~absorption~~ solvents ~~is used~~, ~~having~~ has a boiling point above 200°C at atmospheric pressure.

16. (currently amended) The method as claimed in claim 15, characterized in that ditolylether is used as a heavy hydrophobic solvent.

17. (currently amended) The method as claimed in ~~one of claims 1 to 16~~ claim 18, characterized in that the polymerization inhibitor ~~or inhibitors in the presence of which the~~ ~~absorption is carried out in the column (C1) and the separations are carried in the column (C2)~~ and the sections (S1) to (S3) ~~are~~ is selected from phenolic compounds, ~~such as hydroquinone or methylether of hydroquinone, quinones such as benzoquinone, phenothiazine and its derivatives such as methylene blue, manganese salts, such as manganese acetate, metal thiocarbamates such as the copper salts of dithiocarbamic acid, such as copper dibutyldithiocarbamate, the N-oxyl compounds, among which 4-hydroxy-2,2,6,6-tetramethylpiperidinoxyl, amine compounds, such as derivatives of paraphenylene diamine, compounds with a nitroso group such as N-nitrosophenyl hydroxylamine, and ammonium salts of N-nitrosophenyl hydroxylamine.~~

18. (new) A process for the purification of (meth)acrylic acid from reaction gases obtained by catalytic or redox oxidation of a gas selected from the group consisting of propane, propylene, acrolein, isobutane, isobutene, tertbutyl alcohol, (meth)acrolein and mixture thereof, via extraction in a countercurrent washing of the reaction gases in an extraction column (C1) with at least one heavy hydrophobic solvent fed to the top of the extraction column (C1) and said reaction gases fed to the bottom of said extraction column (C1), characterized in that:

said extraction takes place in the presence of at least one polymerization inhibitor:

a separation of the stream (2) obtained at the bottom of the extraction column (C1), which contains the heavy hydrophobic solvent, (meth)acrylic acid and the at least one polymerization inhibitor, is conducted in separation column (C2) whereby a top stream (3) comprising light impurities is sent to the bottom part of the absorption column (C1) and a bottom stream (4)

comprising (meth)acrylic acid, heavy hydrophobic solvent and the at least one polymerization inhibitor is sent to the top of a first separation section (S1):

a separation of stream (4) in first separation section (S1) forms a top gas stream and a bottom stream (9) containing the heavy hydrophobic solvent stripped of the lighter compounds, said stream being recycled as feed to extraction column (C1) directly or after removal of the heavy products contained in stream (9);

said gas stream obtained at the top of the first section (S1), or a liquid stream generated by the condensation of said gas stream, being sent to the bottom of a second separation section (S2) suitable for concentrating the intermediate heavy compounds of which the boiling point is between that of the one heavy hydrophobic absorption solvent and that of (meth)acrylic acid, and suitable for obtaining a top gas stream and a bottom liquid stream that is sent to the top of the first section (S1):

said gas stream obtained at the top of the second separation section (S2), or the liquid stream generated by condensation of said gas, being sent to the bottom part of a third separation section (S3) suitable for obtaining a top gas stream which is condensed and partly recycled to the top of said separation section (S3), the remainder being recovered as substantially pure (meth)acrylic acid stripped of the heavy impurities and a bottom liquid stream which is sent to the top of the second separation section (S2).

19. (new) The method as claimed in claim 2, characterized in that the number of theoretical trays of column (C3) is 10 to 20, the number of theoretical trays of section (S1) is 1 to 3, of section (S2) is 1 to 5 and of section (S3) is 5 to 15.

20. (new) The method as claimed in claim 2, characterized in that the pressure at the top of column (C3) is 6.7 to 24 kPa, the temperature of the bottom of column (C3) is 180 to 230° C, and the temperature of the top of column (C3) is 65 to 95° C.

21. (new) The method as claimed in claim 8, characterized in that the pressure at the top of column (C3) is 6.7 to 24 kPa, the temperature of the bottom of column (C3) is 170 to 210° C, and the temperature of the top of column (C3) is 60 to 90° C.

22. (new) The method as claimed in claim 2, characterized in that the column (C3) is a distillation column provided with a bottom boiler, a top condenser, with a reflux rate T_R imposed at the top of 0.5/1 to 2/1.

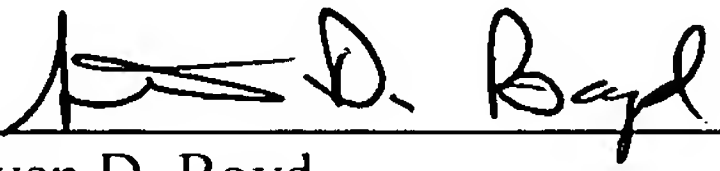
23. (new) The method as claimed in claim 6, characterized in that the pressure at the top of the column (C3₁) is 4 to 15 kPa, ~~and~~ the pressure at the top of the column (C3₂) is 6.7 to 24 kPa, ~~and in that~~ the temperature at the bottom of each of the columns (C3₁) and (C3₂) is 170 to 210°C, and the temperature at the top of each of the columns (C3₁) and (C3₂) is 60 to 90°C.

24. (new) The method as claimed in claim 18, characterized in that the (meth)acrylic acid concentration in the feed to the section (S1) is 10 to 30% by weight.

25. (new) The method as claimed in claim 11, characterized in that the pressure at the top of the column (C4) is 9.3 to 20 kPa.

26. (new) The method as claimed in claim 18 characterized on that the polymerization inhibitor is selected from hydroquinone, methylether of hydroquinone, benzoquinone, phenothiazine and its derivatives, manganese acetate, copper salts of dithiocarbamic acid, copper dibutyldithiocarbamate, 4-hydroxy-2,2,6,6-tetramethylpiperidinoxyl, derivatives of paraphenylene diamine or N-nitrosophenyl hydroxylamine

Respectfully submitted,



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